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Geothermal Power Plant Seeks Earth-Friendly Alternatives



Hot ground water was found just under the surface in a small Bavarian town

Geothermal energy has the potential to provide half of Germany's electricity requirements. Currently, the renewable resource is hardly being used but an innovative power plant in Bavaria could change that.

The groundwater in large parts of southern Germany is literally cooking.

"It's the biggest contiguous region in Europe where we can take advantage of natural hot water. You have to imagine it being like a sponge about the size of Lake Constance," said Christian Schönwiesner-Bozkurt, manager of the community-owned project, Geothermal Project Unterhaching. Surrounded by such a cheap and environmentally friendly energy source, the local council of Unterhaching, a small town south of Munich, developed what is currently Germany's most ambitious geothermal project.

When the complete geothermal system goes online, which is expected by the end of the year, heat will not only be fed into the district heating grid, but also converted into electricity.

The project is about "showing what needs to be done in Germany," said Unterhaching's mayor, Erwin Knappek.

The planning and construction phase took three long years. It was a pilot project that "also had to take into account economic considerations and many new structures had to be set in place," said Schönwiesner-Bozkurt.

Rewards for taking risks



Christian Schönwiesner-Bozkurt

For a town of only 22,000 people, the local council has had to contribute large sums in order to finance project. Costs are expected to total around 70 million euros (\$104 million), with the power plant alone costing 16 million euros.

In order to minimize the risk, the council took out a policy insuring them if they failed to find the hot water reservoir they expected. Luckily, it turned out they didn't need it; back in September 2004, the giant drill hit water with temperatures of 122 degrees Celsius (252 degrees Fahrenheit) at a depth of just over 3 meters (9 feet, 10 inches).

Since then, the company has installed around 140 customer units and around 90 heat transfer stations on the heat network. In the medium term, this will expand to provide around 70 megawatts of heat. Most of the geothermal installations in Europe don't convert heat into energy, but rather directly pipe the heat into homes. These types of installations are numerous in Germany, especially in the former communist East.

New type of plant for Europe

With the heat network already up and running, the most exciting aspect of the project, however, is the power plant currently under construction in Unterhaching.

Germany's sole working plant in Neustadt-Glewe in the state of Mecklenburg-Western Pomerania produces just 0.2 megawatts of energy. The Unterhaching plant, in contrast, will add 3.4 megawatts to the grid.

Unterhaching, which is expected to go online by the end of the year, will use a method of energy production never before used on this scale in Europe -- the Kalina cycle, named after its Russian inventor, Alex Kalina.

The Kalina cycle uses an ammonia-water mixed working fluid that claims higher efficiency than conventional systems.

"This process increases the energy efficiency and could develop into one of Germany's export hits," said Schönwiesner-Bozkurt.

Saving for customers and for the climate

The geothermal energy will be sold to distributors for three times Germany's average 2005 electricity cost because the price is guaranteed for 20 years by the country's 2004 renewable energy law. The direct heat supply should also save customers around 15 percent of their normal heating costs.



The Kalina cycle is said to be more efficient

In addition, the renewable energy project also reduced emissions of carbon dioxide, one of the contributors towards global warming.

"We will save been 30,000 and 40,000 tones of carbon dioxide a year, which is two thirds of the normal CO2 emissions for traditional energy," Mayor Knappek said.

Geothermal fever

In the future, at least a quarter of Unterhaching's households will receive heat and energy from the geothermal project, which has set off a geothermal gold rush. According to Schönwiesner-Bozkurt, more than 90 drilling permits with an estimated investment of 3.5 to four billion euros have been issued recently.

Scientists believe the most economically viable stores of thermal reservoirs in Germany lie on the edge of the Alps, in the southern state of Rhineland-Palatinate and in former East Germany. A 2003 study conducted by the Federal government found that the country's total geothermal potential was 300,000 terawatt hours.

This amount of geothermal energy is usable on a sustainable basis and represents about half of Germany's current energy production. The only drawback is that energy produced by geothermal plants is currently more expensive than coal or gas fired plants.

According to the Federal Geothermic Association, 24,000 geothermal heating units were installed in 2006 -- double the 2005 figure.

This echoes the sentiments of Unterhaching's mayor. "Geothermal is on the advance," Knappek said proudly.